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## Flood resilience and indirect impacts in art cities

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Resilience is commonly defined as the ability to recover from a shock and quickly restore antecedent conditions. Although it is widely recognized as crucial to reduce adverse impacts and it is gaining importance at global level, resilience to most natural hazards is difficult to measure and predict, as both direct and indirect impacts matter. In this work the mutual connection between flood resilience and indirect flood impacts is investigated through a mathematical model which describes the temporal evolution of the state of the system after an urban inundation event. The inputs to the resilience model are i) a hydraulic model simulating the flood hazard; ii) a vulnerability and recovery model estimating the physical damage to cultural heritage and the temporal persistence of direct and indirect consequences. The method is applied to the historic district of Florence (Italy) affected by a severe flood in 1966. The variables selected as proxies of the state of the system are the number of monuments open to the public after the flood and the number of visitors, which represent a measure of indirect social and economic impacts on the city. The model results show that the resilience model helps the quantification of indirect impacts due to the loss of accessibility of cultural heritage and allows evaluating the effectiveness of prevention measures.

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